



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

APR 26 2018

Mr. Thomas Frick
Director
Division of Environmental Assessment & Restoration
Florida Department of Environmental Protection
Mail Station 3000
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Dear Mr. Frick:

The U.S. Environmental Protection Agency has completed its review of the document titled *Nutrient TMDLs for Crescent Lake (WBID¹ 2606B)*. Florida Department of Environmental Protection (FDEP) submitted the Crescent Lake Total Maximum Daily Loads (TMDL) and revised chapter 62-304, Florida Administrative Code (F.A.C.),² including the numeric nutrient criteria (NNC) for the subject water, in a letter to the EPA dated June 19, 2017 as a TMDL and as new or revised water quality standards (WQS) with the necessary supporting documentation and certification by FDEP General Counsel, pursuant to Title 40 of the Code of Federal Regulations part 131.

The NNC were adopted under chapter 62-304.415(51) as site specific numeric interpretations of paragraph 62-302.530(48)(b).³ As referenced in paragraph 62-302.531(2)(a), FDEP intends for the submitted NNC to serve in place of the otherwise applicable criteria for lakes set out in paragraph 62-302.531(2)(b). The total nitrogen, total phosphorus, and chlorophyll *a* TMDL for Crescent Lake would also constitute site specific numeric interpretations of the narrative nutrient criterion set forth in paragraph 62-302.530(48)(b), for this water segment.

FDEP submitted the Crescent Lake TMDL to the EPA for review pursuant to both Clean Water Act (CWA) sections 303(c) and 303(d) since the TMDL will also act as a Hierarchy 1 (H1) site-specific interpretation of the state's narrative nutrient criterion pursuant to 62-302.531(2)(a)1.a. The EPA acknowledges that by virtue of establishing the TMDL in chapter 62-304, FDEP is also establishing an H1 interpretation of the narrative nutrient criterion for this waterbody as new or revised WQS. The enclosed, combined WQS and TMDL decision document summarizes the EPA's review and approval of the WQS and TMDL.

In accordance with sections 303(c) and (d) of the CWA, I am hereby approving the TMDL promulgated in chapter 62-304, for Crescent Lake as both a TMDL and as revised WQS for total nitrogen, total phosphorus, and chlorophyll *a*. The requirements of paragraph 62-302.530(48)(a) remain applicable.

¹ WBID refers to **waterbody identification**

² Unless otherwise stated, all rule and subsection citations are to provisions in the Florida Administrative Code.

³ FDEP recently revised the table of surface water criteria set out at section 62-302.530, F.A.C., adding parameters to the table to incorporate new human health criteria promulgated by the state in 2016. These additions resulted in the state narrative nutrient criteria being renumbered from paragraphs 62-302.530(48)(a) and (b), F.A.C. to paragraphs 62-302.530(90)(a) and (b), F.A.C. The new criteria have not yet been submitted to the EPA for review under the CWA and are not effective for CWA purposes. In this document, the EPA refers to the narrative nutrient criteria as paragraphs 62-302.530(48)(a) and (b).

If you have any comments or questions relating to the approval of the H1 WQS or TMDL, please contact me at (404) 562-9469, or have a member of your staff contact Dr. Katherine Snyder in the WQS program at (404) 562-9840 or Ms. Laila Hudda in the TMDL program at (404) 562-9007.

Sincerely,

A handwritten signature in blue ink, appearing to read 'MSW', is positioned above the printed name.

Mary S. Walker
Director
Water Protection Division

Enclosure

cc: Mr. Kenneth Hayman, FDEP
Mr. Daryll Joyner, FDEP
Ms. Erin Rasnake, FDEP

Florida Numeric Interpretation of the Narrative Nutrient Water Quality Criteria through a Total Maximum Daily Load (TMDL) to establish a Hierarchy 1 (H1): Joint Water Quality Standards (WQS) and TMDL Decision Document

H1: Nutrient TMDLs for Crescent Lake **waterbody identification (WBID) 2606B** and Documentation in Support of Development of Site-Specific Numeric Interpretations of the Narrative Nutrient Criterion

ATTAINS TMDL ID: 67542

Location: Flagler, Putnam, Volusia and St. Johns Counties, Florida

Status: Final

Criteria Parameter(s): The Crescent Lake TMDL established site specific criteria of 1,018,666 lbs/yr for total nitrogen (TN) and 57,959 lbs/yr for total phosphorus (TP) expressed as a 7-year average of annual loads not to be exceeded. The revised chlorophyll *a* (Chl*a*) criterion is 15 µg/L as an annual geometric mean (AGM) not to be exceeded more than once in any consecutive 3-year period.

Impairment/Pollutant: Crescent Lake is located in the Lower St. Johns River Basin, which is a natural river system located in Putnam and Flagler Counties. Some parts of the watershed are also located in St. Johns and Volusia Counties. Crescent Lake is one of the larger freshwater lakes in the Lower St. Johns River Basin, with a surface area of about 43 square miles (or about 27,520 acres). The watershed draining to Crescent Lake covers about 923 square miles. The watershed is made up of agricultural land, residential development, short-rotation forestry and forested wetlands. Crescent Lake has an average depth of about 8 feet and a maximum depth of about 14 feet. Haw Creek (WBID 2622A), which has several contributing streams, primarily feeds the lake. Haw Creek flows north into Crescent Lake. The lake itself also receives flows from other surrounding smaller streams and channels. The lake drains to Dunns Creek to the north, which connects Crescent Lake to the Lower St. Johns Estuary.

The lake was determined to be impaired due to not meeting its Trophic State Index (TSI). In addition, the high color lake was assessed as not meeting the default Numeric Nutrient Criteria (NNC) for TN, TP and Chl*a* established in 62-302.531 of the Florida Administrative Code (F.A.C.), thus not supporting the designated uses of its Class III Freshwater (fish consumption, recreation, propagation and maintenance of a healthy, well-balanced population of fish and wildlife). An H1 was submitted by Florida Department of Environmental Protection (FDEP) that established site-specific criteria for TN, TP and Chl*a* and established TN and TP loads to address the impairment.

Background: FDEP submitted the final H1 for the *Nutrient TMDLs for Crescent Lake (waterbody identification (WBID) 2606B) and Documentation in Support of Development of Site-Specific Numeric Interpretations of the Narrative Nutrient Criterion* (the “H1” or “report”), together with a submittal letter requesting review and approval, to the EPA Region 4 dated June 19, 2017. The draft H1 TMDL report for Crescent Lake is dated June 2016 and was received July 5, 2016. The final Crescent Lake/Lower St. Johns River Basin H1 is dated May 2017 and was delivered in person to the EPA R4 staff for review and approval on June 28, 2017.

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The submission included:

- Submittal letter
- Nutrient TMDL for Crescent Lake and Documentation in Support of the Development of Site-Specific Numeric Interpretations of the Narrative Nutrient Criteria
- Documents related to Public Workshop
- Documents related to Public Hearing
- Documents related to Public Notice for Rulemaking and Rule Adoption
- Summary of Responses to Public Comments Received

This document explains how the report meets the Clean Water Act (CWA) statutory and regulatory requirements for the approval of WQS under section 303(c) and of TMDLs under section 303(d) and the EPA's implementing regulations in 40 CFR Parts 131 and 130, respectively.

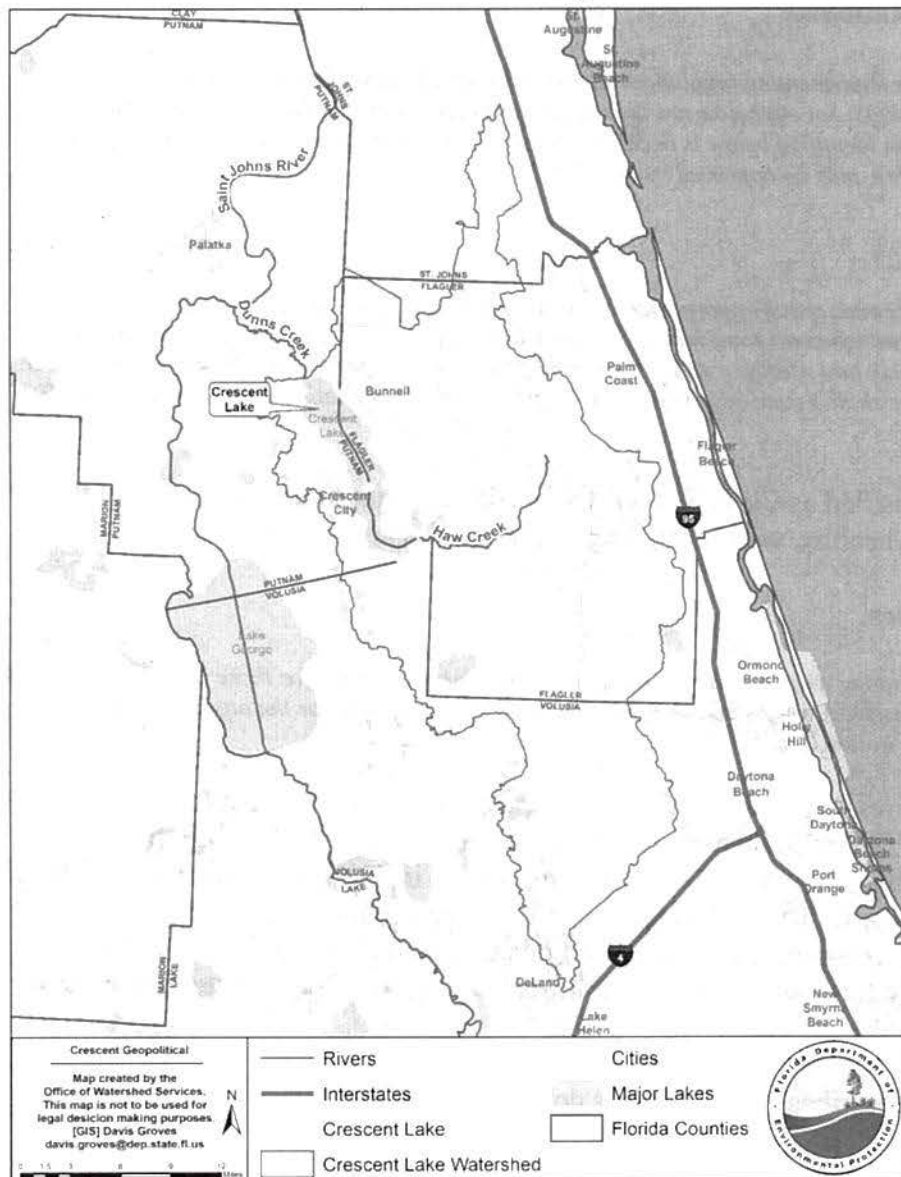
REVIEWERS: WQS: Lydia Mayo, Environmental Scientist, mayo.lydia@epa.gov
TMDL: Joe Pohnan, Environmental Engineer, pohnan.joseph@epa.gov

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Waterbodies addressed in this H1 Approval Action:

Waterbody Name	WBID	Area
Crescent Lake	WBID 2606B	27,520 acres



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This document contains the EPA's review of the above-referenced H1. This review document includes WQS and TMDL review guidelines that state or summarize currently effective statutory and regulatory requirements applicable to this approval action. Review guidelines are not themselves regulations. Any differences between review guidelines and the EPA's implementing regulations should be resolved in favor of the regulations themselves. The italicized sections of this document describe the EPA's statutory and regulatory requirements for approvable H1s. The sections in regular type reflect the EPA's analysis of the state's compliance with these requirements.

I. WQS Decision – Supporting Rationale

Section 303(c) of the CWA and the EPA's implementing regulations at 40 CFR part 131 describe the statutory and regulatory requirements for approvable WQS. Set out below are the requirements for water WQS submissions, under the CWA and the regulations. The information identified below is necessary for the EPA to determine if a submitted WQS meets the requirements of the CWA and, therefore, may be approved by the EPA.

1. Use Designations

Section 131.10(a) provides that each state must specify appropriate water uses to be achieved and protected. The classification of the waters of the state must take into consideration the use and value of water for public water supplies, protection and propagation of fish, shellfish and wildlife, recreation in and on the water, agricultural, industrial, and other purposes including navigation. In no case shall a state adopt waste transport or waste assimilation as a designated use for any waters of the United States.

Assessment: Crescent Lake is classified as Class III Freshwater (fish consumption, recreation, propagation and maintenance of a healthy, well-balanced population of fish and wildlife).

2. Protection of Downstream Uses

Section 131.10(b) provides that in designating uses of a waterbody and the appropriate criteria for those uses, the state shall take into consideration the WQS of downstream waters and shall ensure that its WQS provide for the attainment and maintenance of the WQS of downstream waters.

Rule 62-302.531(4), F.A.C., requires that downstream uses be protected. Crescent Lake drains into the Lower St. Johns River which has TMDL reductions of 30% for both TN and TP. The reductions in the Crescent Lake TMDL require 58% reduction in TP and 34% reduction in TN. Because these reductions are greater than those required in the Lower St. Johns River TMDL, protection of downstream waterbody uses will be provided. As discussed in the report, it is expected that other areas of the St. Johns River watershed will require further reductions in nutrient loading in order to protect the Lower St. Johns River downstream.

Assessment: The H1 adequately describes how it protects downstream uses.

3. Water Quality Criteria

Section 131.11(a) provides that states must adopt those water quality criteria that protect the designated use. Such criteria must be based on sound scientific rationale and must contain sufficient parameters or constituents to protect the designated use. For waters with multiple use designations, the criteria shall support the most sensitive use.

As described in the report, Crescent Lake is impaired due to water quality impairments including TSI, TN, TP, and Chla. Additional monitoring was done to indicate that clarity and rainfall influence TN and TP levels that affect annual algal species growth, blue green algae percentage and Shannon-Weaver

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Diversity Index scores. The change-point analysis conducted using the Shannon-Weaver Diversity Index for algal community composition (Figures 3.1 and 3.2 in section 3.2.2 of the report) indicated that the phytoplankton community or the proportion of blue-green algae compared with the total algal community in Crescent Lake experiences a fundamental change at an AGM Chl a value of 15 $\mu\text{g/L}$. The algal community composition data that were used were collected by the St. Johns River Water Management District (SJRWMD) from 2000-2014. FDEP utilized the Bayesian change-point analysis to confirm the Chl a change-point. Page 75 of the report summarizes that “the relationship between phytoplankton community structure and Chl a concentration was also confirmed with nonmetric multidimensional scaling ordination analyses and the observation that, when the Chl a level was above 15 $\mu\text{g/L}$, the percent blue-green algal biomass accounted for more than 50% of the total community biomass. Therefore, criteria were set at this breakpoint to allow no more than one exceedance in any 3-year period.” The final numeric interpretations of the narrative nutrient criterion were determined to be TP = 57,959 lbs/yr and TN = 1,018,666 lbs/yr (7-year average of annual loads not to be exceeded). The Chl a criterion of 15 $\mu\text{g/L}$ as an AGM is not to be exceeded more than once in any consecutive 3-year period. The corresponding target nutrient concentrations for informational purposes are 1.16 mg/L of TN and 0.05 mg/L of TP.

Assessment: The Crescent Lake H1 LA of 57,959 lbs/yr of TP and 1,018,666 lbs/yr of TN (7-year average of annual loads not to be exceeded) and the Chl a criterion of 15 $\mu\text{g/L}$ as an AGM not to be exceeded more than once in any consecutive 3-year period will result in protection of water quality that supports the designated uses for this waterbody. Any other criteria applicable to this waterbody remain in effect.

4. Scientific Defensibility

Section 131.11(b) provides that, in establishing criteria, states should establish numerical values based on 304(a) guidance, 304(a) guidance modified to reflect site-specific conditions, or other scientifically defensible methods

The report utilizes the measurable indicator and site-specific NNC Chl a concentration of 15 $\mu\text{g/L}$ which has been determined as protective of the designated use for Crescent Lake based on the Shannon-Weaver Diversity Index for algal community composition specifically for this lake, the Bayesian change-point analysis and nonmetric multidimensional scaling. The site-specific criteria established in this H1, and the ambient lake TN and TP concentrations which correspond to those criteria, are expected to protect designated uses for this lake.

Assessment: The EPA determined that the selection of a Chl a value of 15 $\mu\text{g/L}$ as the response variable target and site-specific criterion is appropriate. The use of the U.S. Army Corps of Engineers BATHTUB model, ArcNLET, and SJRWMD Pollutant Load Simulation Model (PLSM) by the state to determine total nitrogen and total phosphorus site-specific criteria that protect the Chl a criterion is an appropriate and defensible method. More detailed technical support information regarding this approach is set out in the report provided by the state.

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5. Public Participation

Section 131.20(b) provides that states shall hold a public hearing when revising WQS, in accordance with provisions of state law and the EPA's public participation regulation (40 CFR part 25). The proposed WQS revision and supporting analyses shall be made available to the public prior to the hearing.

A public workshop was conducted by FDEP on August 4, 2016 in Palatka, Florida to obtain comments on the draft nutrient TMDLs for Crescent Lake. The workshop notice indicated that these nutrient TMDLs, if adopted, constitute site-specific numeric interpretations of the narrative criterion set forth in paragraph 62-302.530(48)(b), F.A.C.,¹ that would replace the otherwise applicable NNC in subsection 62-302.531(2), F.A.C., for these particular waters. FDEP also held a public hearing on April 21, 2017 in Tallahassee, Florida.

Assessment: FDEP has met the public participation requirements for this H1.

6. Certification by the State Attorney General

Section 131.6(e) requires that the state provide a certification by the state Attorney General or other appropriate legal authority within the state that the WQS were duly adopted pursuant to state law.

A letter from FDEP General Counsel, Frederick L. Aschauer, Jr., dated June 19, 2017, certified that the Crescent Lake TMDL was duly adopted as WQS pursuant to state law.

Assessment: FDEP has met the requirement for Attorney General certification for this H1.

7. Endangered Species Section 7 Consultation

Section 7(a)(2) of the Endangered Species Act (ESA) requires federal agencies, in consultation with the Services, to ensure that their actions are not likely to jeopardize the continued existence of federally listed species or result in the destruction or adverse modification of designated critical habitat of such species.

The existing default NNC for the waterbody received concurrence by the U.S. Fish and Wildlife Service (USFWS) on July 31, 2013. Because the TP concentration associated with the TP load established as a site-specific criterion in this H1 is within the default criteria (62-302.531(2)(b)1., F.A.C.), an additional ESA section 7 consultation for the revised TP criterion is not required. On July 21, 2015 the USFWS concurred with the EPA's programmatic consultation on site-specific nutrient criteria for FDEP for any site-specific nutrient criteria that are more stringent than the existing default nutrient criteria in place in the state of Florida for the waterbody. For this H1, because the site-specific Chl_a concentration and the TN concentration associated with the site-specific load criterion are more stringent than the default

¹ FDEP recently revised the table of surface water criteria set out at section 62-302.530, F.A.C., adding parameters to the table to incorporate new human health criteria promulgated by the state in 2016. These additions resulted in the state narrative nutrient criteria being renumbered from paragraphs 62-302.530(48)(a) and (b), F.A.C., to paragraphs 62-302.530(90)(a) and (b), F.A.C. The new criteria have not yet been submitted to the EPA for review under the CWA and are not effective for CWA purposes. In this document, the EPA refers to the narrative nutrient criteria as paragraphs 62-302.530(48)(a) and (b), F.A.C.

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criteria, (62-302.531(2)(b)1., F.A.C.), an additional ESA section 7 consultation for this standards action is not required.

Assessment: The EPA has met the ESA requirements for this action.

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II. TMDL Review

Section 303(d) of the CWA and the EPA's implementing regulations at 40 C.F.R. Part 130 set out the statutory and regulatory requirements for approvable TMDLs. The following information is generally necessary for the EPA to determine if a submitted TMDL fulfills the legal requirements for approval under section 303(d) and the EPA regulations, and should be included in the submittal package. Use of the verb "must" below denotes information that is required to be submitted because it relates to elements of the TMDL required by the CWA and by regulation.

1. Description of Waterbody, Pollutant of Concern and Pollutant Sources

The TMDL analytical document must identify the waterbody as it appears on the State's 303(d) list, including the pollutant of concern. The TMDL submittal must include a description of the point and nonpoint sources of the pollutant of concern, including the magnitude and location of the sources. Where it is possible to separate natural background from nonpoint sources, a description of the natural background must be provided, including the magnitude and location of the source(s). Such information is necessary for the EPA's review of the load and wasteload allocations, which is required by regulation. The TMDL submittal should also contain a description of any important assumptions made in developing the TMDL, such as: (1) the assumed distribution of land use in the watershed; (2) population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources; (3) present and future growth trends, if taken into consideration in preparing the TMDL; and, (4) explanation and analytical basis for expressing the TMDL through surrogate measures, if applicable. Surrogate measures are parameters such as percent fines and turbidity for sediment impairments, or Chla and phosphorus loadings for excess algae.

Crescent Lake is identified on Florida's Verified List of Impaired Waters as not supporting the designated uses of Class III Freshwater by exceeding the TSI criterion. According to section 2.2 of the report, the lake was first included on the Verified List in the Group 2, Cycle 1 assessment due to annual mean TSI values above 60, and during Group 2, Cycle 2 it was again assessed as impaired due to elevated TSI values. The scope of the TMDL analysis includes all of the Crescent Lake Watershed, shown in Figure 1.1 of the report, but only to the extent of modeling Crescent Lake. Other waterbodies within the watershed boundary are not given a TMDL in this report.

Figure 4.3 of the report shows the land use of the Crescent Lake Watershed as of 2009. It illustrates that hay/pasture and wetlands comprise nearly all land use immediately adjacent to Crescent Lake. Also, Table 4.4 gives the percentage breakdown of land use in the watershed – the majority being wetlands and forest. Nonpoint sources of nutrient loading that are explicitly included in the TMDL analysis are stormwater runoff, atmospheric deposition, internal loading/fixation, septic tanks and ground water. These are broken down into natural and non-natural when considering load reductions.

Figure 4.1 of the report shows the location of permitted National Pollutant Discharge Elimination System (NPDES) dischargers. There are two domestic and two industrial wastewater treatment facilities (WWTF) in the Crescent Lake Watershed, but only one of the domestic WWTF is expected to contribute nutrient loading during normal and critical conditions. The City of Bunnell WWTF (NPDES FL0020907) discharges 10 miles upstream of Crescent Lake. The Crescent City WWTF (NPDES FL0021610) does not discharge into Crescent Lake, but instead to a spray field. The Crescent City WWTF is permitted to make emergency discharges during extreme weather events and retains its permit for that purpose.

Figure 4.2 of the report shows the area coverage of the Municipal Separate Storm Sewer Systems (MS4) within the watershed. There are four MS4 permittees in the Crescent Lake Watershed; the City of

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Deland (FLR04E078) and the City of Daytona Beach (FLR04E011) are Phase II permits. Volusia County (FLR04E033) and St. Johns County (FLR04E025) are Phase II-C permits.

Assessment: The EPA concludes that FDEP has adequately identified the impaired waterbodies, the pollutants of concern, and the magnitude and location of the pollutant sources.

2. Description of the Applicable WQS and Numeric Water Quality Target

The TMDL submittal must include a description of the applicable state WQS, including the designated use(s) of the waterbody, the applicable numeric or narrative water quality criterion, and the statewide antidegradation policy. Such information is necessary for the EPA's review of the load and wasteload allocations, which is required by regulation. A numeric water quality target for the TMDL (a quantitative value used to measure whether or not the applicable WQS is attained) must be identified. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, usually site-specific, must be developed from a narrative criterion and a description of the process used to derive the target must be included in the submittal.

In section 3.1 of the report, Crescent Lake is identified as a Class III Freshwater, whose designated uses are defined in 62-302.400(1), F.A.C., as “.” Fish Consumption; Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife

At the time of TMDL development, the applicable WQS were the numeric interpretations of narrative nutrient criteria. These criteria were adopted and put into effect since Crescent Lake’s last assessment cycle where the applicable criterion was TSI. The generally applicable Lake NNC can be found in full in Subparagraph 62-302.531(2)(b)1., F.A.C. Table 3.2 in the report summarizes the criteria, reproduced below:

Table 3.2. Applicable NNC for lakes in Florida

CaCO₃ = Calcium carbonate

Color and Alkalinity	Chlorophyll <i>a</i> (Chl <i>a</i>)	TP if Chl <i>a</i> Exceeded	Total TN if Chl <i>a</i> Exceeded	TP	TN
>40 PCU	20 µg/L	0.05 mg/L	1.27 mg/L	0.16 mg/L	2.23 mg/L
≤ 40 PCU and > 20 mg/L CaCO ₃	20 µg/L	0.03 mg/L	1.05 mg/L	0.09 mg/L	1.91 mg/L
≤ 40 PCU and ≤ 20 mg/L CaCO ₃	6 µg/L	0.01 mg/L	0.51 mg/L	0.03 mg/L	0.93 mg/L

As discussed in section I-3 of this decision document, FDEP examined evidence that suggested that the generally applicable criteria would not be fully protective for Crescent Lake. The rationale for this decision is discussed in section 3.2.2 of the report, which then transitions to the development of site-specific criteria. The result of analyzing the phytoplankton community identified 15 µg/L Chl*a* as a change point in community composition; therefore, 15 µg/L as an AGM (not to be exceeded more than once in a three-year period) was established as the site-specific Chl*a* criterion. The H1 also established site-specific criteria to protect the Chl*a* criterion for TN (1,018,666 lbs/yr) and TP (57,959 lbs/yr) as 7-year average of annual loads not to be exceeded.

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Assessment: The EPA concludes that FDEP has properly addressed its WQS when setting a numeric water quality target.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

As described in the EPA guidance, a TMDL identifies the loading capacity of a waterbody for a particular pollutant. The EPA regulations define loading capacity as the greatest amount of loading that a water can receive without violating WQS (40 C.F.R. section 130.2(f)). The loadings are required to be expressed as either mass-per-time, toxicity or other appropriate measure (40 C.F.R. section 130.2(i)). The TMDL submittal must identify the waterbody's loading capacity for the applicable pollutant and describe the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources. In most instances, this method will be a water quality model. Supporting documentation for the TMDL analysis must also be contained in the submittal, including the basis for assumptions, strengths and weaknesses in the analytical process, results from water quality modeling, etc. Such information is necessary for the EPA's review of the load and wasteload allocations, which is required by regulation.

In many circumstances, a critical condition must be described and related to physical conditions in the waterbody as part of the analysis of loading capacity (40 C.F.R. section 130.7(c)(1)). The critical condition can be thought of as the "worst case" scenario of environmental conditions in the waterbody in which the loading expressed in the TMDL for the pollutant of concern will continue to meet WQS. Critical conditions are the combination of environmental factors (e.g., flow, temperature, etc.) that results in attaining and maintaining the water quality criterion and has an acceptably low frequency of occurrence. Critical conditions are important because they describe the factors that combine to cause a violation of WQS and will help in identifying the actions that may have to be undertaken to meet WQS.

Crescent Lake's loading capacity was determined by running modeling scenarios with varying TN and TP loads, while targeting a Chla AGM of 15 µg/L not to be exceeded more than once in any consecutive 3-year period. The water quality model used was BATHTUB, a steady-state water quality model designed for stimulating loading eutrophication response in reservoirs and lakes. Several other models were used to provide inputs to BATHTUB including the curve number method of deriving runoff flow values, ArcNLET to generate groundwater loads originating from septic tanks, PLSM to derive event mean concentration values (EMC), and Darcy's equation to model ground water flow. Raw data inputs included watershed meteorological data, atmospheric deposition data measured by SJRWMD for nearby Lake Apopka, Crescent Lake bathymetry data from the National Oceanic and Atmospheric Administration, average groundwater nutrient concentrations from FDEP's Generalized Well Information System Database, and historical nutrient data used for model calibration.

The modeling scenarios progressed by iteratively reducing nutrient EMC values of individual anthropogenic land uses – but not reduced below wetland or upland forest EMC values – until target Chla conditions were reached. The load capacity was taken to be the highest calculated 7-year rolling average from the 14-year timeframe of the final modeling scenario. The largest simulated averages corresponded to limits of 57,959 lbs/year TP and 1,018,666 lbs/year TN applied as 7-year rolling averages. This represents 34% and 58% reductions of TN and TP, respectively, from existing conditions.

Assessment: The EPA concludes that the loading capacity, having been calculated using the EPA-reviewed water quality models and using observed concentration data and water quality targets consistent with numeric water quality criteria, has been appropriately set at a level necessary to attain and maintain the applicable WQS. The H1 is based on a reasonable approach for establishing the relationship between pollutant loading and water quality.

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4. Load Allocation (LA)

The EPA regulations require that a TMDL include LAs, which identify the portion of the loading capacity allocated to existing and future nonpoint sources and to natural background (40 C.F.R. section 130.2(g)). Load allocations may range from reasonably accurate estimates to gross allotments (40 C.F.R. section 130.2(g)). Where it is possible to separate natural background from nonpoint sources, load allocations should be described separately for background and for nonpoint sources.

If the TMDL concludes that there are no nonpoint sources and/or natural background, or the TMDL recommends a zero load allocation, the LA must be expressed as zero. If the TMDL recommends a zero LA after considering all pollutant sources, there must be a discussion of the reasoning behind this decision, since a zero LA implies an allocation only to point sources will result in attainment of the applicable WQS, and all nonpoint and background sources will be removed.

Several categories of nutrient nonpoint sources were considered and included in the BATHTUB model: direct runoff, internal loading and fixation, atmospheric deposition, ground water, and septic system leakage. The relative and absolute estimated contribution of all these sources, and of point sources, is given in Table 5.6 of the report.

Nutrient loadings due to runoff were estimated for all land use types, but only non-natural land uses are considered for load reduction. These land uses are presented in Table 5.5 of the report and show that pasture, cropland, and other agriculture are by far the largest load contributing non-natural land uses. In total, runoff was estimated to contribute 290,568 kg/yr (36.8% non-natural) and 48,318 kg/yr (66.7% non-natural) of TN and TP, respectively.

Atmospheric deposition was considered as natural background and was accounted for in the TMDL. The measured yearly deposition rates per area (of wet and dry deposition) are given in Table 5.1 of the H1. Total loading from atmospheric deposition is estimated to be 60,776 kg/yr and 53,309 kg/yr of TN and TP, respectively.

Groundwater was modeled as having a natural nutrient component and a component due to septic systems. The natural component is estimated from flow calculated from Darcy's equation and measured average nutrient concentrations. The ArcNLET model was used to simulate the nutrient loading contributed to Crescent Lake from septic tanks, which is estimated to be 2,160 kg/yr TN. It was assumed that most phosphorus from septic tanks would be adsorbed during transport; therefore, septic tanks were not considered a contributing source of TP.

There were no measured nitrogen fixation data for Crescent Lake available. Instead, an internal load of 10 mg /($\text{m}^2 \cdot \text{day}$) TN was inferred from the difference in measured data and results of the current conditions modeling scenario. A fixation load was added into BATHTUB for subsequent modeling scenarios as a scalar value of Chl a with the ratio of 10 mg /($\text{m}^2 \cdot \text{day}$) TN and current measured Chl a as a coefficient. From that relationship, nitrogen fixation was estimated to be 252,012 kg/yr TN.

The LAs are expressed as the percent reductions of current nutrient loading that would equal the target loadings, 34% and 58% for TN and TP, respectively. Since the reductions will only be applied to anthropogenic sources, actual required reductions will vary from source to source based on these estimates, but must total to the TMDL values.

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Assessment: The EPA concludes that the LAs provided in the report are reasonable and will result in attainment of the WQS.

5. Wasteload Allocation (WLA)

The EPA regulations require that a TMDL include WLAs, which identify the portion of the loading capacity allocated to existing and future point sources (40 C.F.R. section 130.2(h)). If no point sources are present or if the TMDL recommends a zero WLA for point sources, the WLA must be expressed as zero. If the TMDL recommends a zero WLA after considering all pollutant sources, there must be a discussion of the reasoning behind this decision, since a zero WLA implies an allocation only to nonpoint sources and background will result in attainment of the applicable WQS, and all point sources will be removed.

In preparing the wasteload allocations, it is not necessary that each individual point source be assigned a portion of the allocation of pollutant loading capacity. When the source is a minor discharger of the pollutant of concern or if the source is contained within an aggregated general permit, an aggregated WLA can be assigned to the group of facilities. However, it is necessary to allocate the loading capacity among individual point sources as necessary to meet the WQS.

The TMDL submittal should also discuss whether a point source is given a less stringent wasteload allocation based on an assumption that nonpoint source load reductions will occur. In such cases, the state will need to demonstrate reasonable assurance that the nonpoint source reductions will occur within a reasonable time.

Only one of the four NPDES permitted point source dischargers, the Bunnell City WWTF, regularly contributes to nutrient loading in Crescent Lake. Its WLA is derived from the maximum discharge defined in its permit, resulting in a WLA of 701 pounds of phosphorus and 12,702 pounds of nitrogen per year. This WLA does not represent a load reduction from historical conditions; rather, it is justified by a zero discharge modeling scenario determined to be not statistically different from current conditions which suggests no measurable water quality impact from this plant. This result is expected as Bunnell City's historical discharge is less than a percent of current loading. Historical discharge levels are below this WLA.

Two MS4s, City of Deland and Volusia County, are both subject to load reductions. The general landscape load reduction requirement, 58% for phosphorus and 34% for nitrogen, applies for the urbanized areas in the Crescent Lake watershed. Table 4.3 of the report shows that Volusia County and City of Deland's urban areas within the watershed cover 3,620 and 414 acres, respectively. Table 6.1 of the report, describing the TMDL loads for these two MS4s is included below.

Table 6.1. TMDL components for Crescent Lake

* 151 lbs TP per day

† 2672 lbs TN per day

WBID	Parameter	TMDL (lbs/yr)	WLA-NPDES wastewater (lbs/yr)	WLA-NPDES MS4 Stormwater (%)	LA (%)	MOS
2606B	TP	57,959*	701	58	58	Implicit
2606B	TN	1,018,666†	12,702	34	34	Implicit

Assessment: The EPA concludes that the WLAs provided in the report are reasonable and will result in the attainment of WQS. The H1 accounts for all point sources discharging to impaired segments in the

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watershed and the WLAs require that TN and TP loads comply with water quality criteria (TMDL targets). This requirement is incorporated in to the WWTP permit limits at the point of discharge.

6. Margin of Safety (MOS)

The statute and regulations require that a TMDL include a margin of safety to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality (CWA section 303(d)(1)(C), 40 C.F.R. section 130.7(c)(1)). The EPA 1991 guidance explains that the MOS may be implicit, i.e., incorporated into the TMDL through conservative assumptions in the analysis, or explicit, i.e., expressed in the TMDL as loadings set aside for the MOS. If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS must be described. If the MOS is explicit, the loading set aside for the MOS must be identified.

An implicit MOS was included through a conservative assumption incorporated into the model. It was assumed that loading from point and nonpoint sources are not attenuated during transport to Crescent Lake. Within the BATHTUB models, loadings are added directly to lake segments irrespective of distance from source. For example, a point source discharging into Haw Creek, 10 miles upstream of Crescent Lake, has its load added directly to the model lake segment instead of assuming that a partition would remain in Haw Creek. Under this assumption nutrient loading to Crescent Lake will be overestimated, as will the percent reductions needed to meet the water quality target.

Assessment: The EPA concludes that the H1 incorporates an adequate MOS.

7. Seasonal Variation

The statute and regulations require that a TMDL be established with consideration of seasonal variations. The method chosen for including seasonal variations in the TMDL must be described (CWA section 303(d)(1)(C), 40 C.F.R. section 130.7(c)(1)).

Seasonal variations are included within the BATHTUB model by using all available data from 2000 to 2013 as direct inputs or calibration points and three distinct seasonal EMC values for each land use. This 14-year timeframe is described as including two wet periods and three dry periods, capturing a longer term hydrologic variability. There is not a seasonal critical condition associated with the TMDL values since they are based on a 7-year rolling average of annual loads. This level of loading was intended to make it likely that the Chla criterion, which was determined to be protective year round, is not exceeded more than once every three years.

In section 5.2 of the report an ordination analysis is carried out. Figure 5.14 is an ordination plot said to indicate that algal blooms were most likely to occur during late summer. Further ordination analysis suggests that cyanobacteria growth occurs primarily during dry periods.

Assessment: The EPA concludes the H1 allocations ensure protection of WQS throughout all seasons.

8. Monitoring Plan to Track TMDL Effectiveness

The EPA's 1991 document, Guidance for Water Quality-Based Decisions: The TMDL Process (EPA 440/4-91-001), recommends a monitoring plan to track the effectiveness of a TMDL, particularly when a TMDL involves both point and nonpoint sources, and the WLA is based on an assumption that nonpoint source load reductions will occur. Such a TMDL should provide assurances that nonpoint source controls will achieve expected load reductions, and such TMDL should

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include a monitoring plan that describes the additional data to be collected to determine if the load reductions provided for in the TMDL are occurring and leading to attainment of WQS.

According to section 5.3.3 of the report, the majority of water quality monitoring has been carried out by the SJRWMD, and at the time of TMDL development there were plans to increase their monitoring in the southern area of the lake beginning in 2015. These additional monitoring data are expected to better characterize agricultural loading from the watershed area south of Crescent Lake. Water quality monitoring and project tracking plans can be part of a Basin Management Action Plan (BMAP). BMAPs themselves are discretionary, but in section 1.3 of the report it is said that a BMAP will follow this TMDL and a monitoring plan may be included.

Assessment: Although not a required element of the EPA's TMDL approval process, FDEP provided a recommended monitoring plan to evaluate the progress toward attainment of WQS. The EPA is taking no action on the monitoring plan.

9. Implementation Plans

On August 8, 1997, Bob Perciasepe (the EPA Assistant Administrator for the Office of Water) issued a memorandum, "New Policies for Establishing and Implementing Total Maximum Daily Loads (TMDLs)," that directs Regions to work in partnership with states to achieve nonpoint source load allocations established for 303(d)-listed waters impaired solely or primarily by nonpoint sources. To this end, the memorandum asks that Regions assist states in developing implementation plans that include reasonable assurances that the nonpoint source load allocations established in TMDLs for waters impaired solely or primarily by nonpoint sources will in fact be achieved. The memorandum also includes a discussion of renewed focus on the public participation process and recognition of other relevant watershed management processes used in the TMDL process. Although implementation plans are not approved by the EPA, they help establish the basis for the EPA's approval of TMDLs.

Section 7 of the report discusses implementation plan development in general, including required and discretionary ways for the TMDL to be implemented, and a recommendation for Crescent Lake specifically.

It is mandatory for NPDES permittees discharging to Crescent Lake to take action to address the TMDL, unless they already have management actions defined in a BMAP. BMAPs are a discretionary TMDL implementation tool that may be developed by FDEP or a local entity and are adopted by the FDEP Secretary, making them legally enforceable. BMAPs describe management strategies that will reduce pollutant loads and, also identify what entities are responsible for carrying out these strategies.

Since the majority of the loading is from nonpoint sources, section 7.3 of the report recommended that coordination take place between FDEP, SJRWMD, and other local entities to implement reductions. This coordination is described in more detail in section 1.3 of the report, where it asserts there will be development and implementation of a restoration plan and identifies FDEP, SJRWMD, the Tri-County Agricultural Area, and local municipalities as important prospective participants.

Assessment: Although not a required element of the TMDL approval, FDEP discussed how information derived from the TMDL analysis process can be used to support implementation of the TMDLs. The EPA is taking no action on the implementation portion of the report.

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10. Reasonable Assurances

The EPA guidance calls for reasonable assurances when TMDLs are developed for waters impaired by both point and nonpoint sources. In a water impaired by both point and nonpoint sources, where a point source is given a less stringent wasteload allocation based on an assumption that nonpoint source load reductions will occur, reasonable assurance that the nonpoint source reductions will happen must be explained in order for the TMDL to be approvable. This information is necessary for the EPA to determine that the load and wasteload allocations will achieve WQS.

In a waterbody impaired solely by nonpoint sources, reasonable assurances that load reductions will be achieved are not required in order for a TMDL to be approvable. However, for such nonpoint source-only waters, states are strongly encouraged to provide reasonable assurances regarding achievement of load allocations in the implementation plans described in section 9, above. As described in the August 8, 1997 Perciasepe memorandum, such reasonable assurances should be included in state implementation plans and "may be non-regulatory, regulatory, or incentive-based, consistent with applicable laws and programs."

The TN and TP TMDLs are predominately the LAs and MS4 WLAs. As such, it is acknowledged in section 7.3 of the report that nonpoint source reductions would be the focus of any restoration plan. A BMAP is planned to follow this TMDL and section 7.2 of the report discusses some ways a BMAP can address nonpoint source. BMAPs include lists of management strategies such as agricultural Best Management Practices (BMPs), identification of mechanisms to address pollutant loading from future developments, and assignment of pollutant reduction responsibilities to sources in the watershed. Additionally, Crescent Lake will continue to be assessed under the new, more stringent, criteria established in the report.

Two MS4s have load reduction responsibilities over their jurisdiction, which are equal to the general LA reduction. Appendix B of the report contains background information on the federal and state stormwater program requirements. Florida's program relies on implementing BMPs designed to reach performance standards (maximum extent practical). Water management districts must establish pollutant load reduction goals and adopt them as part of a Surface Water Improvement and Management Plan (or equivalent). All MS4 permits include a clause that allows permit revisions to implement TMDLs after an implementation plan is formally adopted.

Assessment: The EPA considered the reasonable assurances contained in the report. Point sources are required to comply with their NPDES permits, which must include the requirements and assumptions of the H1. The point sources have to meet the criteria at the point of discharge in order to meet the regulatory definition of "not causing or contributing to a water quality violation." Reductions for nonpoint sources are expected to occur as a result of the incentive and voluntary programs already in place.

11. Public Participation

The EPA policy is that there must be full and meaningful public participation in the TMDL development process. Each state must, therefore, provide for public participation consistent with its own continuing planning process and public participation requirements (40 C.F.R. section 130.7(c)(1)(ii)). In guidance, the EPA has explained that final TMDLs submitted to the EPA for review and approval must describe the state's public participation process, including a summary of significant comments and the state's responses to those comments. When the EPA establishes a TMDL, the EPA regulations require the EPA to publish a notice seeking public comment (40 C.F.R. section 130.7(d)(2)).

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Inadequate public participation could be a basis for disapproving a TMDL; however, where the EPA determines that a state has not provided adequate public participation, the EPA may defer its approval action until adequate public participation has been provided for, either by the state or by the EPA.

Public participation began with the posting of a draft TMDL on the FDEP TMDL website allowing a 30-day public comment period ending August 16, 2016. Additionally, a public workshop was held on August 4, 2016. It was advertised through websites, email lists, a local newspaper, and the Florida Administrative Register (FAR). Written comments were received from the Florida Department of Transportation, and the TMDL report was revised in response to those comments.

After revision, public notice of the proposed rule (H1) was posted in FAR Volume 43, Number 41 issue on March 1, 2017. Included in that notice is a summary and purpose of the TMDLs, full text of the rule, an estimate of the regulatory cost of the proposed rule, instructions and timeframe for responding to the notice, and a date for the public hearing. The public hearing was held on April 21, 2017 and no audience members commented or testified at that time.

Assessment: The EPA concludes that the State involved the public during the development of the H1, provided adequate opportunities for the public to comment on the report, and provided reasonable responses to the comments received.

12. Submittal Letter

A submittal letter should be included with the TMDL analytical document, and should specify whether the TMDL is being submitted for a technical review or is a final submittal. Each final TMDL submitted to the EPA must be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under section 303(d) of the CWA for the EPA review and approval. This clearly establishes the state's intent to submit, and the EPA's duty to review, the TMDL under the statute. The submittal letter, whether for technical review or final submittal, should contain such information as the name and location of the waterbody, and the pollutant(s) of concern.

Assessment: Accompanying the State's final TMDL for nutrients was a submittal letter dated June 19, 2017, from Frederick L. Aschauer, Jr., General Counsel, FDEP, requesting the review and approval of the nutrient TMDLs for Wacissa River, Wacissa Springs, Crescent Lake, Lake Denham, Lake Weir, Marshall Lake, Lochloosa Lake, Cross Creek and Lake Roberts.

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III. Conclusion

The Water Protection Division is **APPROVING** the H1 NNC and TMDL addressed by this decision document in accordance with sections 303(c) and 303(d) of the CWA, as consistent with the CWA and 40 CFR parts 131 and 130, respectively.

The H1 NNC presented in this decision document will constitute the site-specific numeric interpretation of the narrative nutrient criterion set forth in paragraph 62-302.530(48)(b), F.A.C., that will replace the otherwise applicable numeric criteria for nitrogen, phosphorus and Chl a in subsection 62-302.531(2), F.A.C., for this particular water, pursuant to paragraph 62-302.531(2)(a)1.b., F.A.C. Based on the chemical, physical and biological data presented in the development of the H1 NNC outlined above, the EPA concludes that the revised NNC provide for and protect healthy, well-balanced, biological communities in the waters to which the NNC apply and are consistent with the CWA and its implementing regulations at 40 CFR part 131.11.

Therefore, the revised nutrient criteria for Crescent Lake are loads of 1,018,666 lbs/yr for TN and 57,959 lbs/yr for TP expressed as a 7-year average of annual loads not to be exceeded and a Chl a concentration of 15 μ g/L as an AGM not to be exceeded more than once in any consecutive 3-year period. The requirements of paragraph 62-302.530(48)(a), F.A.C., remain applicable.

Furthermore, after a full and complete review, the EPA finds that the H1 for Crescent Lake/Lower St. Johns River Basin for TN, TP and Chl a satisfies all of the elements of approvable TMDLs. This approval is for the *Nutrient TMDLs for Crescent Lake (WBID 2606B) and Documentation in Support of the Development of Site-Specific Numeric Interpretations of the Narrative Criterion*, addressing Crescent Lake for use impairments due to nutrients based on TSI and NNC.

